CLAIMS

What is claimed is:

1. A miniature combustor comprising:

a chamber having first and second ends,

a liquid-fuel inlet into the chamber, and

a gas inlet formed in a first end of the chamber,

wherein the chamber having a lateral dimension transverse to a major flow direction within the chamber that is sub-centimeter.

2. The combustor of claim 1 wherein the lateral dimension is in a range of about 1.0 to 3.0 millimeters.

3. The combustor of claim 1 wherein the chamber is generally cylindrical.

4. The combustor of claim 1 wherein the length of the chamber is in a range of about 1.0 to 10.0 centimeters.

5. The combustor of claim 1 wherein the liquid-fuel inlet comprises a fuel injector oriented to eject fuel onto a surface within the chamber.

6. The combustor of claim 1 wherein the liquid-fuel inlet comprises at least a portion of a chamber wall formed of a porous material.

7. The combustor of claim 1 wherein the liquid-fuel inlet comprises a plurality of orifices.

8. The combustor of claim 8 further comprising a plurality of liquid fuel injectors, each coupled to one of the plurality of orifices and oriented tangentially to a wall of the chamber and orthogonally to the major flow direction within the chamber.

9. The combustor of claim 8 wherein the plurality of liquid fuel injectors comprise first and second set of injectors wherein the first and second set of injectors are symmetrically opposed about the chamber.

10. The combustor of claim 1 further comprising a swirl generator.

11. The combustor of claim 10 wherein the swirl generator comprises a swirler positioned within the chamber adjacent the first end.

12. The combustor of claim 10 wherein the swirl generator comprises a plurality of gas inlets tangentially coupled to the chamber adjacent the first end of the chamber.

13. The combustor of claim 12 further comprising an axial gas inlet adjacent the first end of the chamber.

14. The combustor of claim 13 further comprising an adjustable gas flow splitter coupled to the axial gas inlet and the plurality of tangential gas inlets.

15. A combustion process comprising the steps of

injecting liquid into a combustion chamber,

forming and maintaining a liquid film over substantially an entire interior surface of the chamber,

injecting an oxidizing gas into the chamber, and

burning an oxidizing gas and fuel mixture within the chamber.

16. The method of claim 15 wherein the liquid is a fuel.

17. The method of claim 16 wherein the liquid is an inert liquid and the fuel is a gaseous fuel.

18. The method of claim 15 wherein the liquid is a combination of a liquid fuel and an inert liquid.

19. The method of claim 15 further comprising the step of swirling the injected air.

20. The method of claim 15 wherein the step of forming and maintaining a liquid film over substantially an entire interior surface of the chamber, includes reducing combustion heat losses to walls of the chamber.

21. The method of claim 15 wherein the step of injecting an oxidizing gas includes injecting the oxidizing gas axially into the chamber and swirling the axially in-flowing gas by passing it through a swirl generator positioned adjacent to an inlet of the chamber.

22. The method of claim 15 wherein the step of injecting an oxidizing gas includes injecting the oxidizing gas axially into the chamber and injecting the oxidizing gas orthogonally to the axial gas injection and tangentially to walls of the chamber.

23. The method of claim 22 further comprising the step of separately controlling the axial and tangential injection of the oxidizing gas .